भारतीय मानक
Indian Standard

IS 17637 : 2021

फर्नीचर प्रयोग में सतही फिनिश की कार्यकारिता अपेक्षाएं

Performance Requirements of Surface Finishes for Furniture Applications

ICS 97.140

© BIS 2021

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

December 2021 **Price Group 6**

Furniture Sectional Committee, CED 35

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Furniture Sectional Committee had been approved by the Civil Engineering Division Council.

In view of the diversification in the use of different materials in furniture industry, now different variety of surfaces of furniture are available in the market. But these surface finishes must fit for their purposes and also must be durable. On the basis of the different type of uses of the furniture the surface performances need to be evaluated by using different test methods.

This standard covers the performance requirements of surface finishes for panel materials, fabrics, synthetic and natural leather used in different furniture applications.

In the formulation of this standard, assistance has been taken from BS 6222-3 : 2017 'Domestic Kitchen Equipment — Part 3: Performance requirements for durability of surface finish and adhesion of surfacing and edging materials — Specification'.

The composition of the Committee responsible for the formulation of this standard is given in Annex E.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960. 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PERFORMANCE REQUIREMENTS OF SURFACE FINISHES FOR FURNITURE APPLICATIONS

1 SCOPE

This standard covers the performance requirements of surface finishes for panel materials, fabrics, synthetic and natural leather used in furniture applications.

2 REFERENCES

The Indian standards given in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purposes of this part of standard, the following definitions shall apply.

3.1 Edging — Strip of material, less than 3 mm thick, applied to the edge of a panel.

3.2 Lipping — Strip of material, with a thickness of 3 mm or more, applied to the edge of a panel.

3.3 Worktop — Panel, complete with any surface finish, to be fixed at working height, that is generally used for various work facilities.

4 TYPE OF SURFACES

4.1 Worktops

Worktops include:

a) Decorative plastics laminated top surface and separate decorative plastics laminate edging;

b) One or more moulded edges covered by a single decorative plastics laminate, that follows the contours of the edge or edges;

NOTE — Also known as “post-formed” worktops.

c) Decorative plastics laminate top surface and lipping of solid timber or other material; and

d) Wood or other lignocellulosic materials based top surface and lipping.

4.2 Other Surfaces

Other surfaces includes the surfaces of doors, drawer fronts, carcase material, interior and exterior shelving, and all unfinished exposed surfaces like wardrobe back, drawer bottom, etc.

5 SURFACE FINISH PERFORMANCE REQUIREMENTS

5.1 Worktops

The worktop surface (for domestic and office applications) shall meet the minimum performance ratings given in column (3) and (4) of Table 1 when tested in accordance with the referred test methods.

5.2 Other Surfaces

Other surfaces shall conform to the minimum performance ratings specified in column 5 of Table 1 when tested in accordance with the referred test methods.

6 ADHESIVE PERFORMANCE REQUIREMENTS

Adhesion performance of surfacing and edging materials to the substrate shall conform to Table 2 as applicable.

7 FABRIC AND LEATHER (SYNTHETIC AND NATURAL) PERFORMANCE REQUIREMENTS

Fabric, synthetic leather shall meet the requirements as given in Table 3 and for natural leather shall meet the requirements as given in Table 4.

Table 1 Surface Finish Performance Requirements

(*Clauses* 5.1 *and* 5.2)

Sl No.	Requirement	Minimum Performance Rating			Method of Test
		Worktops Type 1 (Horizontal Surface - Domestic)	Worktops Type 2 (Horizontal Surface - Office)	Other Surfaces	
(1)	(2)	(3)	(4)	(5)	(6)
i)	Resistance to mechanical impact, rating	–	–	3	IS 17641
ii)	Resistance to mechanical impact (large steel ball)	Indentation diameter less than 10.5 mm	Indentation diameter less than 10.5 mm	–	Annex B
iii)	Pencil hardness	1H	2H	1H	Annex C
iv)	Resistance to wet heat				
	i) 55 °C	5	5	3	IS 17639
	ii) 70 °C	4	4	2	
	iii) 85 °C	4	4	–	
v)	Resistance to dry heat				
	i) 120 °C	5	5	–	IS 17638
	ii) 140 °C	4	4	–	
	iii) 160 °C	3	3	–	
vi)	Resistance to marking by cold liquids (for in duration)				
	a) Ethanol [48 percent, (v/v)]	4	4	3	IS 17640
	b) Tea	5	5	5	
	c) Coffee	5	5	5	
	d) Paraffin oil	4	4	3	
	e) Ammonia [4 percent (m/m) aqueous solution]	4	4	3	
	f) Olive oil	5	5	5	
vii)	Resistance to marking by cold oils and fats (for 24 h duration)				
	Solid vegetable oil	5	5	4	
	Solid animal fat	5	5	4	

NOTES

1) The rating codes for the tests are specified in the Indian Standard as applicable.

Table 2 Adhesion of Surface Materials and Edging Materials to Substrate

(*Clause* 6)

Sl No.	Surface and Edging Materials	Performance Rating (Minimum)	Method of Test
(1)	(2)	(3)	(4)
i)	Rigid and semi-rigid surface materials (for example, plastics laminate, wood veneer, paper foil, and PVC rigid or semi-rigid foil)	40 °C, rating 4 50 °C, rating 3 60 °C, rating 3 70 °C, rating 3[1]	Annex D
ii)	Edgings, lippings and continuous strip handles	40 °C, rating 4 50 °C, rating 3 60 °C, rating 3	

[1] Only applies to worktops.

NOTE — The rating codes for the tests as specified in Table C-1.

Table 3 Performance Requirements for Fabrics and Synthetic Leather

(*Clause* 7)

Sl No.	Test	Performance Requirements				Test Methods	
		Woven	Knitted	PVC Synthetic Leather	EPU Synthetic Leather	Woven/Knitted	PVC/EPU Synthetic Leather
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Breaking load (50 mm × 200 mm cut strip), N, *Min*	350 (both directions)	350 (both directions)	250 (length wise) 200 (width wise)	400 (length wise) 500 (width wise)	IS 1969 (Part 1)	IS 7016 (Part 2)
ii)	Elongation at break, percent, *Min*	Warp: 25 Weft: 20	For knitted regular fabric, Length: 35, Width: 40 For mesh and net, Length: 50, Width: 50	Length: 40 Width: 135	Length: 15 Width: 30		
iii)	Tear strength, N, *Min*	25 (both directions)	–	25 (both directions)	60 (both directions)	IS 6489 (Part 1)	IS 7016 (Part 3/Sec 1) or IS 7016 (Part 3/Sec 2)
iv)	Colour fastness to light[a], rating, *Min*	4	4	4	4	← IS/ISO 105-B02 →	
v)	Colour fastness to rubbing[b], rating, *Min*	Dry 4, Wet 3	Dry 4, Wet 3	Dry 4, Wet 4	Dry 4, Wet 4	← IS/ISO 105-X12 →	
vi)	Colour fastness to perspiration[b], rating, *Min*	3	3	–	–	IS/ISO 105-E04	–
vii)	Colour fastness to water[b], rating, *Min*	3	3	–	–	IS/ISO 105- E01	–
viii)	Pilling resistance[c], grade, *Min*	3 (for 5 000 cycle)	3 (for 5 000 cycle)	–	–	IS 10971 (Part 1) or (Part 2)	–
ix)	Coating adhesion strength, N, *Min*	–	–	30 (both directions)	30 (both directions)	–	IS 7016 (Part 5)
x)	Seam slippage	< 4 mm Open at 180 N Load	–	–	–	IS/ISO 13936-2	–
xi)	Resistance to damage by flexing, cycles, *Min*	–	–	2 00 000	2 00 000	–	IS 7016 (Part 4)
xii)	Abrasion resistance, cycles, *Min*	25 000 (Domestic) at 12 kPa load 35 000 (Office) at 12 kPa load	25 000 (Domestic) at 12 kPa load 35 000 (Office) at 12 kPa load	–	–	IS 12673 (Part 2)	–
xiii)	Bursting strength, kg/cm^2, *Min*	12	12 (for knitted fabric) 18 (for net and mesh)	8	12	IS 1966 (Part 1)	
xiv)	Resistance to cold (250 mm per 6 mm strip)	–	–	No cracking of coating (0 °C +/–2 °C for 30 min)	No cracking of coating (0 °C +/–2 °C for 30 min)	–	IS 1259

NOTES

[a] Rating according to blue wool scale

[b] Rating according to grey scale

[c] Rating according to pilling grade

Table 4 Performance Requirements for Natural Leather

(*Clause* 7)

Sl No. (1)	Test (2)	Performance Requirements (3)	Test Methods (4)
i)	Tear strength, N	≥ 20 (Single edge tear)	IS 5914
ii)	Flexing endurance (20 °C and 50,000 Cycle)	Dry : No damage Wet: No damage	
iii)	Finish adhesion, N/10 mm	≥ 2	IS 6191 (Part 5)
iv)	Colour fastness to artificial light[a)], rating	≥ 5	IS/ISO 105 B02
v)	Colour fastness to rubbing, rating (perspiration 80 cycle)	Dry: > 4 (500 cycle), Wet: > 3 (250 cycle)	IS 6191 (Part 4)
vi)	Colour fastness to water spotting	No residual mark or permanent swelling (after 30 min and after 16 h)	IS 6191 (Part 1)
vii)	Water vapour permeability, gm/cm^2/hr, *Min*	2	IS 5914
viii)	Colour fastness to water	Not less than grade 3	IS 6191 (Part 2)

[a)] Rating according to blue wool scale

ANNEX A

(*Clause* 2)

LIST OF INDIAN STANDARDS

IS No.	*Title*
1259 : 1984	Specification for vinyl coated fabrics (*third revision*)
1375 : 1981	Specification for black lead pencils (*first revision*)
1966 (Part 1) : 2009	Textiles — Bursting properties of fabrics determination of bursting strength and bursting distension: Hydraulic method (*second revision*)
1969 (Part 1) : 2018	Textiles — Tensile properties of fabrics: Determination of maximum force and elongation at maximum force using the strip method (*fourth revision*)
5914 : 1970	Methods of physical testing of leather
6191	Methods of micro-biological, colour fastness and microscopical tests for leather
(Part 1) : 2018	Colour fastness to water spotting
(Part 2) : 2017	Colour fastness to water
(Part 4) : 2018	Colour fastness to cycles of to-and-fro rubbing
(Part 5) : 2018	Test for adhesion of finish
6489 (Part 1) : 2011	Textiles — Tear properties of fabrics: Part 1 Determination of tear force using ballistic pendulum method (Elmendorf) (*second revision*)
7016 (Part 2) : 2015	Methods of test for coated and treated fabrics: Determination of tensile strength and elongation at break (*second revision*)
(Part 3/Sec 1) : 2017	Determination of Tear Resistance, Section 1 Constant rate of tear methods (*second revision*)
(Part 3/Sec 2) : 2017	Determination of Tear Resistance, Section 2 Ballistic pendulum method (*second revision*)
(Part 4) : 2003	Rubber or plastics — Coated fabrics — Determination of resistance to damage by flexing (*second revision*)
(Part 5) : 2019	Rubber or plastics — Coated fabrics — Determination of coating adhesion (*third revision*)
10971 (Part 1) : 2011	Textiles — Determination of fabric propensity to surface fuzzing and to pilling: Pilling box method (*first revision*)
(Part 2) : 2011	Modified Martindale method (*first revision*)
12673	Textiles — Determination of the abrasion resistance of fabrics by the martindale method
(Part 2) : 2014	Determination of specimen breakdown (*first revision*)
IS/ISO 13936 (Part 2) : 2004	Textiles — Determination of the slippage resistance of yarns at a seam in woven fabrics: Fixed load method
17638 : 2021	Assessment of surface finish resistance to dry heat — Method of test
17639 : 2021	Assessment of surface finish resistance to wet heat — Method of test
17640 : 2021	Assessment of surface finish resistance to cold liquids — Method of test
17641 : 2021	Assessment of surface finish resistance to impact — Method of test
IS/ISO 105-B02 : 2014	Textiles — Tests for colour fastness: Part B02 Colour fastness to artificial light: Xenon arc fading lamp test
IS/ISO 105-E01 : 2013	Textiles — Tests for colour fastness: Part E01 Colour fastness to water (*first revision*)
IS/ISO 105-E04 : 2013	Textiles — Tests for colour fastness: Part E04 Colour fastness to perspiration (*first revision*)
IS/ISO 105-X12 : 2016	Textiles — Tests for colour fastness: Part X12 Colour fastness to rubbing (*first revision*)

ANNEX B

(*Table* 1)

RESISTANCE TO MECHANICAL IMPACT (LARGE STEEL BALL)

B-1 PRINCIPLE

Test to determine the maximum drop height of a large diameter steel ball onto a worktop without causing visible cracking of the surface or producing an imprint greater than the specified maximum diameter.

B-2 APPARATUS

B-2.1 Free-fall ball impact test apparatus, conforming to Fig. 1, or equivalent to produce the same results.

B-2.2 Polished steel ball, (324 ± 5) g, (42.8 ± 0.2) mm diameter, with no damaged or flattened surface.

B-2.3 Sample clamping jig, conforming to Fig. 2.

B-3 TEST SAMPLES

Test samples shall be (230 ± 5) mm × (230 ± 5) mm.

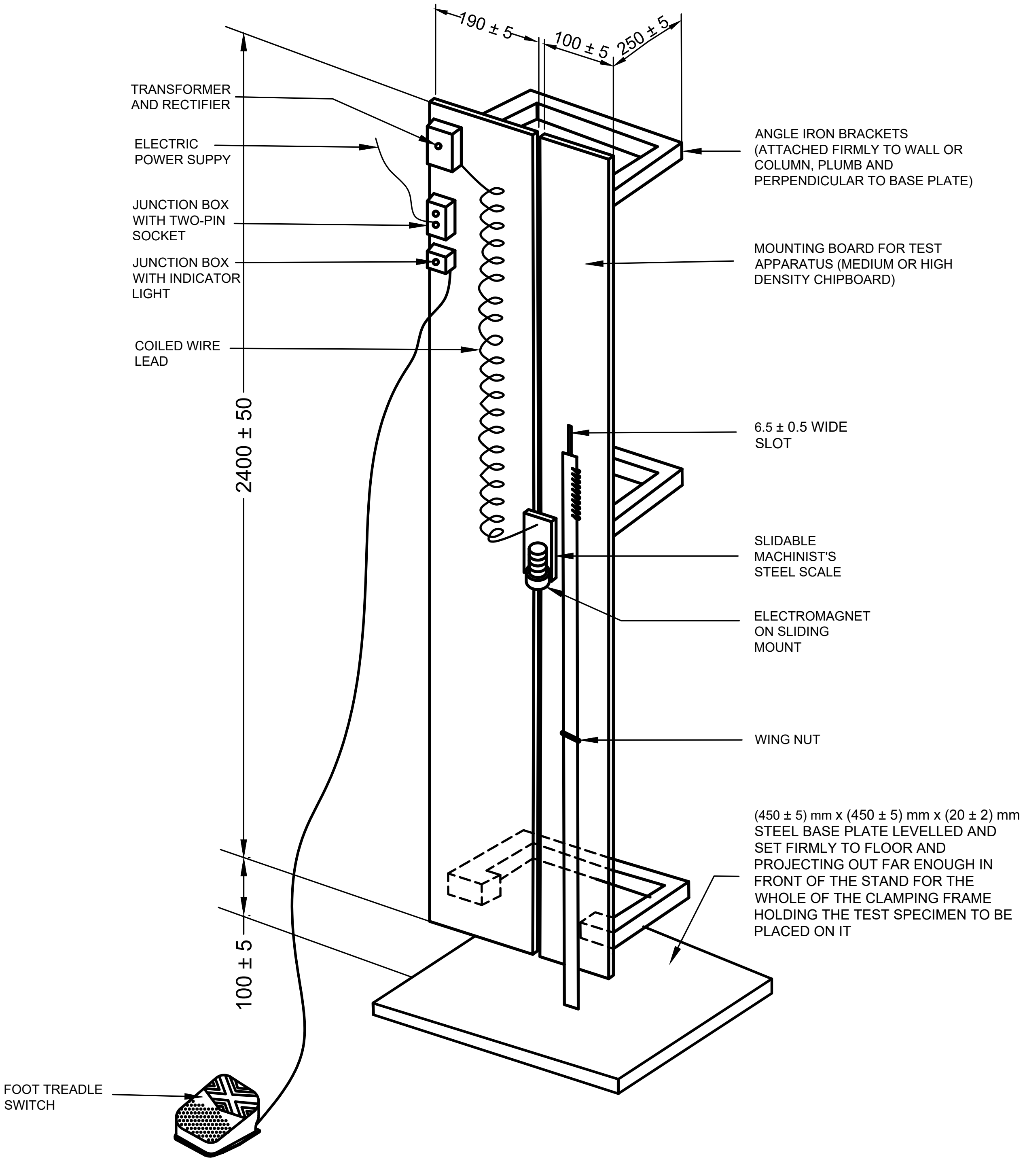
B-4 PROCEDURE

Carry out the test at (27 ± 2) °C.

Clamp the sample in the clamping jig and place the assembly on the solid base of the free-fall ball impact test apparatus. Cover the sample with a sheet of carbon paper with the coated face in contact with the decorative surface. Adjust the height scale so that the base of the scale touches the face of the test sample.

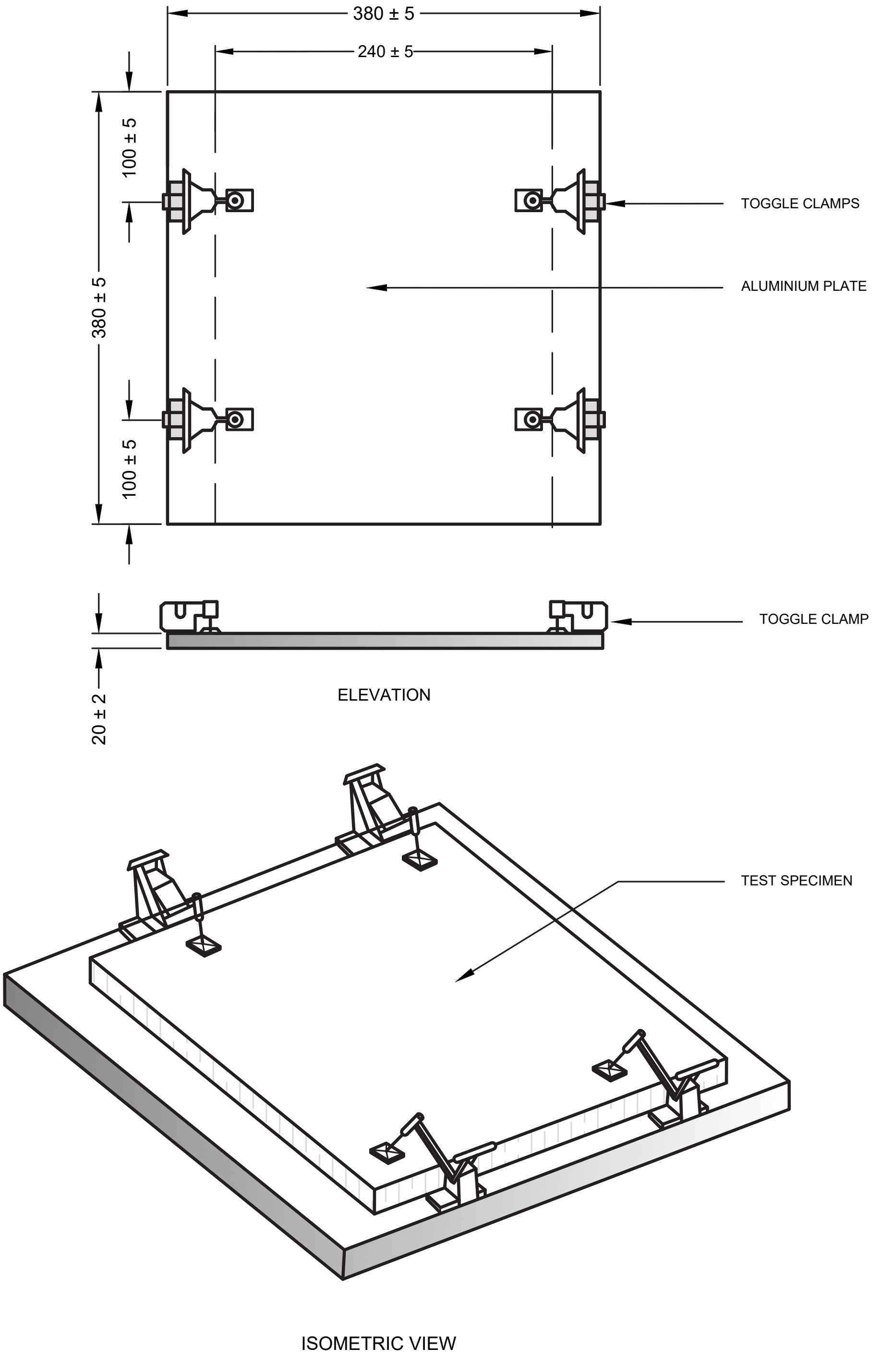
Position the electromagnet at a height on the scale of (450 ± 2) mm. Energize the electromagnet and place the steel ball on it. Operate the release mechanism so that the ball falls on the sample, and catch the ball on the first rebound so that multiple impacts cannot occur.

Measure the diameter of the impact spot.


190 ± 5
100 ± 5
250 ± 5
TRANSFORMER AND RECTIFIER
ELECTRIC POWER SUPPY
JUNCTION BOX WITH TWO-PIN SOCKET
JUNCTION BOX WITH INDICATOR LIGHT
COILED WIRE LEAD
2400 ± 50
100 ± 5
FOOT TREADLE SWITCH
ANGLE IRON BRACKETS (ATTACHED FIRMLY TO WALL OR COLUMN, PLUMB AND PERPENDICULAR TO BASE PLATE)
MOUNTING BOARD FOR TEST APPARATUS (MEDIUM OR HIGH DENSITY CHIPBOARD)
6.5 ± 0.5 WIDE SLOT
SLIDABLE MACHINIST'S STEEL SCALE
ELECTROMAGNET ON SLIDING MOUNT
WING NUT
(450 ± 5) mm x (450 ± 5) mm x (20 ± 2) mm STEEL BASE PLATE LEVELLED AND SET FIRMLY TO FLOOR AND PROJECTING OUT FAR ENOUGH IN FRONT OF THE STAND FOR THE WHOLE OF THE CLAMPING FRAME HOLDING THE TEST SPECIMEN TO BE PLACED ON IT

All dimensions in millimetres

FIG. 1 FREE-FALL BALL IMPACT TEST APPARATUS



All dimensions in millimetres

Fig. 2 Clamping Jig

ANNEX C

(*Table* 1)

PENCIL HARDNESS TEST

C-1 APPARATUS

Range from HB to 3H of high quality drawing pencils in accordance with IS 1375.

C-2 PROCEDURE

The pencils shall be sharpened to a point with a pencil sharpener. The softest pencil shall be held normal to the paint film to be tested and pressed sufficiently to make the point crumble. Without altering the pressure, the pencil is drawn across the paint film for a distance of 6 mm. This procedure shall be repeated with pencils of higher grades of hardness until the paint film is scratched or penetrated. The grade of hardness of the pencil used immediately before that which caused scratching or penetration shall be taken as the hardness of the paint film.

C-2.1 Carry out three tests and record the observations.

ANNEX D

(*Table* 2)

ASSESSMENT OF ADHESION OF SURFACING AND EDGING MATERIAL TO SUBSTRATES

D-1 PRINCIPLE

To assess the performance of adhesives used to bond surfacing and edging materials to wood-based substrates by exposing a test panel with bonded surfacing or edging material in position (for example a door or drawer front) to an elevated temperature cycle of (48 ± 2) h at (40 ± 2) °C, (50 ± 2) °C, (60 ± 2) °C, and for worktops (70 ± 2) °C.

D-2 APPARATUS

Dry air circulating oven, able to keep any temperature between 40 °C and 70 °C to an accuracy of ± 2 °C, with a low relative humidity.

D-3 PREPARATION OF TEST SAMPLES

Select three full size panels or, if this is not convenient, cut panels, including at least 300 mm × 300 mm of surfacing or 300 mm of edging, from randomly selected areas of the furniture.

D-4 PROCEDURE

Expose the samples for (48 ± 2) h at (40 ± 2) °C in the dry air circulating oven (**D-2**). After (48 ± 2) h at the test temperature, assess the surfacing and/or edging bonds in accordance with **D-5**.

Continue the test for successive (48 ± 2) h periods at (50 ± 2) °C, (60 ± 2) °C and (for surfacing laminate on worktops only) (70 ± 2) °C, or until complete delamination occurs.

D-5 ASSESSMENT OF RESULTS

At the end of each (48 ± 2) h test period, remove the sample from the oven and immediately examine the test area for defects. Assess the performance rating in accordance with Table 5.

Table 5 Performance Rating for Adhesion of Surfacing and Edging Materials to Substrates

(*Clause* D-5)

Sl No. (1)	Test Results (2)	Performance Rating (3)
i)	No spontaneous delamination, does not peel	5
ii)	No spontaneous delamination, peels with difficulty	4
iii)	No spontaneous delamination, peels easily	3
iv)	Some spontaneous delamination	2
v)	Complete spontaneous delamination	1

NOTE — A knife blade may be used to just initiate peeling.

ANNEX E

(*Foreword*)

COMMITTEE COMPOSITION

Furniture Sectional Committee, CED 35

Organization	*Representative(s)*
In Personal Capacity (*II A, K-11, Ground Floor, Kailash Colony, New Delhi 110048*)	Shri Balbir Verma (***Chairman***)
Association of Furniture Manufacturers and Traders (I), Mumbai	Representative
Blowplast (BP) Ergonomics Ltd, Mumbai	Dr Nitin Sudame Dr Gita Pirama l(*Alternate*)
Central Public Works Department, New Delhi	Shri A. K. Sharma Shrimati Nandni Mukopadhyay (*Alternate*)
Centre for Environmental Planning and Technology (CEPT) University, Ahmedabad	Prof Shrutie Tamboli Prof Snehal Nagarsheth (*Alternate*)
CSIR-Central Building Research Institute, Roorkee	Shri S. K. Negi Shri Ashok Kumar (*Alternate*)
Directorate of Education, Govt of NCT of Delhi, Delhi	Representative
Forest Research Institute, Dehradun	Dr Sadhna Tripathi Dr Kishan Kumar (*Alternate*)
Godrej & Boyce Mfg Co Ltd, Mumbai	Shri Ega Venkateshwarlu Shri Nirav Shah (*Alternate* I) Shri Lalitesh Mandrekar (*Alternate* II)
Government e-Marketplace, New Delhi	Representative
Indian Furniture Products Ltd (Zuari), Tiruvallur	Shri C. M. Satheesh Kumar Shri S. Saravanan (*Alternate*)
Institute of Indian Interior Designers, Mumbai	Shrimati Chirashree Thakkar
Kendriya Bhandar, New Delhi	Representative
Military Engineer Services, Engineer-in-Chief's Branch, Integrated HQ of MoD (Army), New Delhi	Shrimati Rivoo Mahendru Shri S. K. Mishra (*Alternate*)
Ministry of Women and Child Development, New Delhi	Representative
National Institute of Design, Ahmedabad	Shri P. Rama Krishna Rao Shri C. S. Susanth (*Alternate*)
National Institute of Occupational Health (NIOH), Ahmedabad	Shri J. Majumdar
Nilkamal Limited, Mumbai	Shri V. S. Iyer Shri Arvind Janardanam (*Alternate*)
Office of Development Commissioner, Micro Small and Medium Enterprises, New Delhi	Shri K. L. Rao Shri K. K. Funda (*Alternate*)
School of Planning and Architecture, New Delhi	Prof Manoj Mathur Prof Aruna Ramani Grover (*Alternate*)
The Indian Institute of Architects, Mumbai	Ar Vikramray Pramodray Pandya

Organization	*Representative(s)*
The Supreme Industries Limited, New Delhi	Shri Sanjeev Jain Shri Mukesh Kaul (*Alternate* I) Shri Sanjay Dogra (*Alternate* II)
In Personal Capacity (*Pratap Nursery Lane, Near Gurudwara Sahib, Panditwari, Dehradun*)	Shri K. S. Pruthi
BIS Directorate General	Shri Sanjay Pant, Scientist 'F' and Head (Civil Engineering) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri Pradeep Singh Shekhawat
Scientist 'D' (Civil Engineering), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: CED 35 (16975).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg CHANDIGARH 160019	265 0206 265 0290
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	2832 9295, 2832 7858 2832 7891, 2832 7892

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi